COMP9444 Neural Networks and Deep Learning
Session 2, 2018

Exercises 3: Variations and Geometry

This page was last updated: 09/06/2018 09:07:41

---

1. **Bayes' Rule**

   One bag contains 2 red balls and 3 white balls. Another bag contains 3 red balls and 2 green balls. One of these bags is chosen at random, and two balls are drawn randomly from that bag, without replacement. Both of the balls turn out to be red. What is the probability that the first bag is the one that was chosen?

2. **Hidden Unit Geometry**

   Consider a fully connected feedforward neural network with 6 inputs, 2 hidden units and 3 outputs, using tanh activation at the hidden units and sigmoid at the outputs. Suppose this network is trained on the following data, and that the training is successful.

Item	Inputs	Outputs
	123456	123
1.	100000	000
2.	010000	001
3.	001000	010
4.	000100	100
5.	000010	101
6.	000001	110

   Draw a diagram showing
   a. for each input, a point in hidden unit space corresponding to that input, and
   b. for each output, a line dividing the hidden unit space into regions for which the value of that output is greater/less than one half.

Make sure you try answering the Exercises yourself, before checking the Sample Solutions